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ABSTRACT

Detailed instructions for the construction of apparatus to detect qualitatively the production of carbon dioxide by respiring organisms are given, with notes on its use and comments on its advantages compared with traditional equipment. The chemistry section of the bulletin contains the results of tests of the efficiency of several laboratory burners designed for use with Liquified Petroleum Gas and recommendations of the brands most suitable for use in Scottish Schools. A list of surplus physics apparatus available for purchase, by Scottish Schools, from the Scottish Schools Science Equipment Research Centre is included, and a supplement lists recommended biology apparatus. (AL)

ED 065298

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SCOTTISH SCHOOLS SCIENCE

EQUIPMENT RESEARCH

CENTRE

SE 014 183

Bulletin No. 53 1 February 1972.

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Introduction

With this Bulletin we are posting a list of amendments to the Biology Equipment List which was issued just over a year ago. We have decided to do this because the list is quite recent and reasonably easy to bring up to date. Our other equipment lists are also being revised.

Whilst on this subject of equipment we would like to remind teachers that new apparatus is constantly being introduced by manufacturers, and thus equipment lists can very soon become obsolete as regards capital equipment such as power packs, microscopes, balances, pH meters, colorimeters, chart recorders and so on. When buying equipment of this type teachers are therefore strongly recommended to telephone or write for up-to-date information.

We feel certain that many teachers throughout the country have found useful sources of materials needed in science courses. In particular we would like to know of sources of rocks, minerals and fossils. The sources might be museums, quarries or mines, which would be pleased to get rid of unwanted specimens and samples to County Science Centres or individual teachers.

A few dates are still available for exhibitions. Please send in your request for an exhibition as soon as possible to ensure getting it on the date requested.

Chemistry Notes

Liquified Petroleum Gas (L.P.G.) Burners L.P.G. as supplied, for example, by Calor Gas Company is either propane or butane and is supplied in various sizes of cylinders, coloured red for propane and grey for butane. For piped supplies propane is supplied from a cylinder outside the building. The cylinder is fitted with a pressure controller to deliver the gas at a pressure of 14 inches of water. Butane is used for caravans, etc. and also has a pressure controller fitted to the cylinder, the pressure of the gas in this case being 11 inches of water. Since town gas is supplied at a pressure of about 5 inches of water and natural gas at a pressure of 8.3 inches of water, it is dangerous to use town gas or natural gas burners with propane or butane, because the flow of these gases would be too great.

As a result of a complaint about the inefficiency of L.P.G. standard bunsen burners supplied to a school in Aberdeenshire, we have tested these burners and also a number of other standard bunsen burners obtained from various suppliers. The burners from the school mentioned and from almost all the suppliers were very unsatisfactory and/

and had the following faults, e.g. low heating rate, very smokey flame when air valve closed, many had a luminous flame with the air valve fully open. Results of the tests carried out are given below, under the headings: 1) Time for 250g water at 20°C to reach boiling point. This was carried out with a 500cm^3 beaker on wire gauze on a tripod stand, the burner being adjusted, if possible, for the blue cone to reach the gauze. 2) Flame height with air valve closed. 3) Flame temperature determined from change of resistance of platinum wire coil in the hottest flame obtainable. 4) Stability of the flame: obtained by finding the distance from an air blower at which the flame was blown out.

For comparison purposes the results for a standard town gas burner are included.

Burner Tested	(1) Time to heat 250g of water to B.P.	(2) Flame Height	(3) Flame Temperature	(4) Stability of flame
Town gas model	4½ minutes	400mm	1124°C	160mm
School burner	15 minutes	220mm	1059	1270mm
Supplier A	15 minutes	220mm	1059	1270mm
Supplier B	17 minutes	220mm	1070	1340mm
Flamefast	5½ minutes	400mm	1109	1160mm
Amal	7 minutes	320mm	1072	970mm
Supplier C	Reached 68°C in 40 minutes	55mm	850	3300mm
Supplier D	8 minutes	300mm	1008	1175mm

From the above results it is obvious that the two best burners of those tested are the Flamefast and Amal. For both of these burners different jets are available to make them suitable for town gas, natural gas or L.P.G.

Flamefast Engineering Ltd. burners, directly or from Griffin and George. Model 701, Standard Burner. Choice of jet for town, natural gas or L.P.G. Price 85p.

Amal Ltd. burners are obtainable directly from the firm. "Graduate" No. 512/2/42 Standard Burner. Choice of jet for town, natural gas or L.P.G. Price 58p.

A micro burner of good performance, model 710, is also available from Flamefast. Price is 88p. with jet to suit the gas being used. Teclu and Meker burners from different suppliers were found to be quite satisfactory.

* * * * * * * *

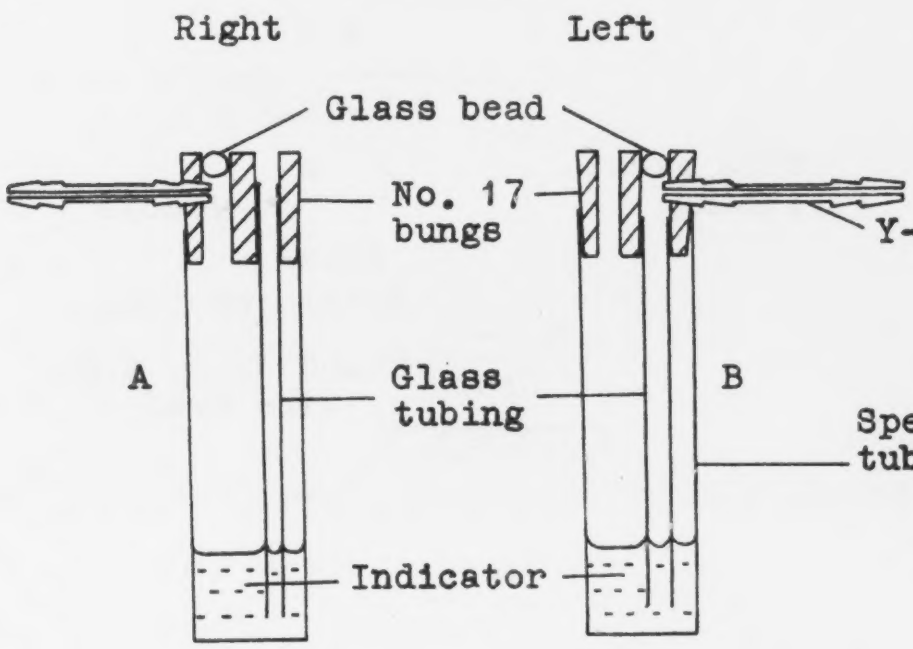
"Hazards in the Chemical Laboratory" is a recent R.I.C. Publication. It is a follow up to the "Laboratory Handbook of Toxic Agents". 430 hazardous chemicals are dealt with under the headings, hazards, toxic/

toxic effects, first aid, and disposal. Obtainable from the Chemical Society Publications Sales Office, the price is £2.00 paperbound, or £3.00 casebound. Members of the R.I.C. and Chemical Society are allowed a discount of 25%.

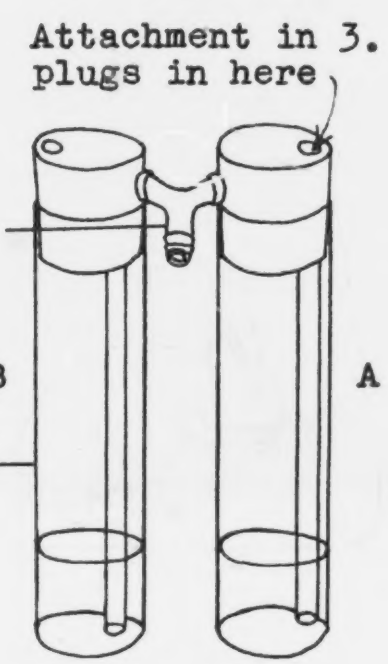
Biology Notes

A Respiration Module. In the detection of carbon dioxide production by a range of living organisms with bicarbonate indicator, (sections IV (2) (a) and (b) of the new syllabus), some confusion frequently arises from the superficial differences between the apparatus used, viz. 2 conical flasks with a T-junction for human breath; bell jar, conical flasks and air pump for small mammals; test tube with zinc platform for smaller organisms. In addition, large quantities of indicator have to be made up and aspirated before a class practical. The apparatus described consists of a central 'module' (diagram 1.) into which are plugged containers appropriate to the size of the organisms. A very small quantity of indicator is required and this is constantly re-used. Further, there is no need to aspirate the indicator before a lesson; the pupils themselves can do this, with an empty syringe.

1. Sectional View



Front View

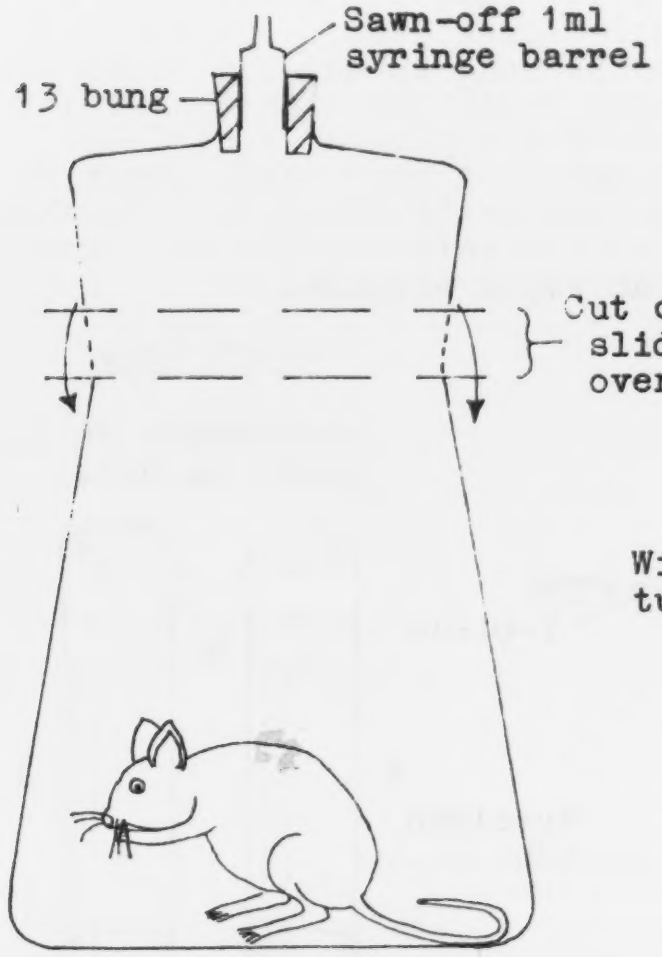


About 2cm of indicator is put into each tube. Small organisms, such as germinating seeds or insects, are contained in a 20ml syringe which is plugged into the Y-piece. Withdrawal of the syringe plunger draws air through the indicator in tube A and into the syringe barrel; depression of the plunger then pushes the air through/

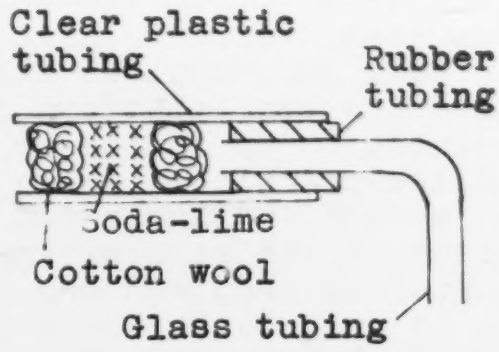
through the indicator in tube B. When the indicator in B has turned yellow the syringe of organisms is removed. The indicator can now be returned to the equilibrium orange/red colour, either by aspirating the module with an empty syringe or, more quickly, by using a syringe containing soda-lime, although in the latter case care has to be taken to ensure that the indicator does not go past the equilibrium point. This syringe can also be used, of course, to demonstrate the purple colouration caused by carbon dioxide - free air.

Small mammals are placed in the container shown in diagram 2; this is then also plugged in and aspirated by gentle squeezing at the join. Pupils can investigate their own breath by removing the plunger from a 20ml syringe and breathing through the barrel; the plunger is then re-inserted, the syringe plugged in and the module aspirated.

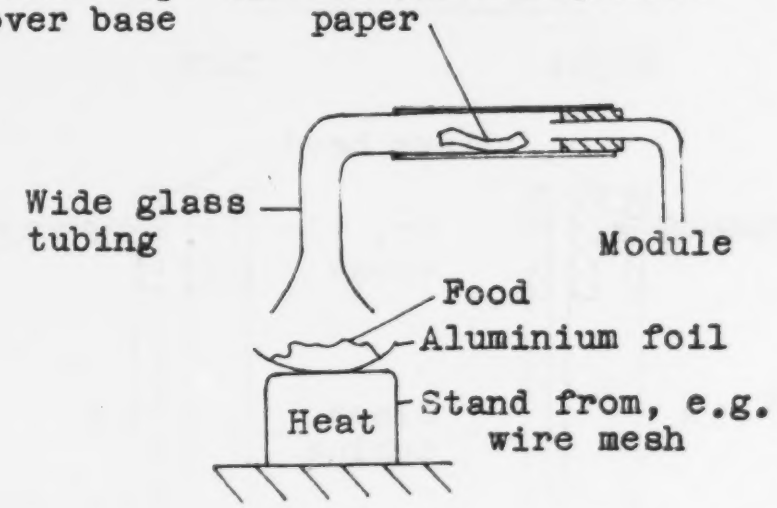
2.



3.



4.



A further plug-in attachment (diagram 3) contains soda-lime so that carbon dioxide can be removed from the atmospheric air entering the module. With this in position, the module is equivalent to the traditional filter pump / 2 conical flasks / bell jar / conical flask arrangement for demonstrating respiration. The attachment may also be necessary at times if a high carbon dioxide level in the laboratory air causes the indicator to turn yellow with normal aspiration. It is/

is important that the cotton wool holding the soda-lime in place be loosely packed, to allow free air flow.

With small organisms, including soil microflora and fauna, the apparatus gives faster results, and appears to be easier to use, than the zinc platform / test tube method. If the organisms are placed in the syringes for 5 to 10 minutes before aspirating, a significant colour change should be seen within seconds. To prevent small animals from being squashed by over-enthusiastic aspiration, a short length of 18SWG wire can be twisted round the plunger shaft so that the plunger is stopped at the 10ml mark.

Another use of the module which has been tried at the Centre is for the detection of carbon dioxide and water production, and oxygen removal, when foods are burnt - (III (1) (b) of the new syllabus). The arrangement is shown in diagram 4. The soda-lime in the plug-in attachment is replaced by one or two pieces of cobalt chloride or thiocyanate paper, and the glass tubing with funnel-shaped end then inserted. The gases from the burning food (e.g. powdered biscuit) are drawn over the indicator paper, and then through the bicarbonate indicator, which quickly turns yellow. The aspirating syringe is then detached - with the plunger fully out so that the barrel is full of the gases - and connected to an analysis tube, as shown on page 4 of Bulletin 50. It may also be possible to use the module in other ways, for example for passing gases through blood samples.

Materials required

a) For module

Nylon Y-piece	Macfarlane Robson	O.D.6-7mm	XT1983	20p each
Glass tubing	Griffin	4-5mm diam.	S.42-151/1004	36½p per bundle
Rubber bungs	Griffin	No. 17 (double-hole)	S.38-620/17	25½p per 12
Plastic Specimen tubes	Bioserv	17ml	BE.35/04	90p per 100
Disposable syringes	Gerrard	20ml	NL.418	9p each

b) For mammal container

'Bubble-bath' plastic container			Boots the Chemist	
Rubber bung	Griffin	No. 13(single-hole)	S38-610/013	21½p per 12
Disposable syringe	Gerrard	1ml	NL 418	6p each

* * * * * * * *

We apologise for an error in the Bulletin Supplement in Bulletin 52. The last line has been omitted in the introductory paragraph and should have been: S - Suitable. U - Unsuitable.

Physics Notes

The following items of surplus equipment are available at the Centre. The number in brackets after an item number indicates the Bulletin in which the item was first advertised and in which a full description will be found. We would remind teachers that they may give their order by telephone or letter and we will hold the item in reserve for them indefinitely until they send the official order form or cash.

Item 15 (31) Relays, 5p.

Item 17 (31) Potentiometers, 2½p.

Item 18 (31) Block paper capacitors, 2½p.

Item 24 (32) Transformers and chokes, 10p.

Item 25 (32) Electronic valves, 2½p.

Item 49 (36) D.C. Voltmeter relays, 25p.

Item 50 (39) Ratemeters, (Contamination meter No. 1), £1.50.

Item 51 (39) Rotary transformer, 35p.

Item 52 (39) Rotary transformer, 25p.

Item 56 (39) Height capsule, 10p.

Item 68 (41) Pocket dosimeters, 5p.

Item 69 (41) Dosimeter charging units, 50p.

Item 103 (47) Radiation monitoring film, ½p.

Item 105 (47) Cable lengths, 2½p.

Item 107 (47) Electrolytic capacitors, 2½p.

Item 118 (51) Large permanent magnet, without keeper, £2.00.

Item 119 (51) Telephone headset, 25p.

Item 127 (51) Steel ball bearing, 3/32in diameter, 100 for 15p.

Item 128 (51) Fixed resistors, 10%, 1p.

Item 129 (51) Fixed resistors, 1%, 1p.

Item 130 (51) Wirewound fixed resistors, 1p.

Item 131 (51) High value resistors, 5p.

Item 132 (51) Gear trains, 50p.

Item 139 (51) Longneck flask, Pyrex, 500cm^3, 10p.

Item 142 (51) Storage jars, 4oz. 2p.

Item 143 (51) Filter plates, 5p.

Item 145 (51) High vacuum stopcocks, 4mm bore, 10p.

Item 146 (51) Pyrex stoppers, B29 cone size, 2p.

Item 149 (51) Specimen tubes, 2in x 5/8in, 2½p per 10.

Item 150 (51) Capillary tubing, 5p per 5ft.

Item 154 (51) Starting resistor for lamp, 10p.

Item 172 (51) Quickfit flasks, distilling flasks, soxhlet apparatus, 10p to 50p each.

Item 175 (51) Chemicals. Large range, 10% of list price.

Item 176 (51) Filter papers; extraction thimbles, 5% of list price.

Item 197 (51) Drawing instrument sets, B.S.2460, £2.00.

Item 198 (51) Creed perforator, 230V, 15W motor, £3.00.

Item 200 (51) Vapour pressure apparatus, 20p.

Item 203 (51) Electric fans, 3 rubber blades, 115V, 25p.

Item 205 (51) Red ink, 2 fluid oz. bottles, 2p.

The following items have been added to our stock.

Item 210 Fletcher trolley, G. and G., L22-652, £4.00.

Item 211 Demonstration gyroscope, 240V electric motor, weight 27kg. £5.00.

Item 212 Electrically maintained tuning forks 50Hz, with take off contacts. 2 off. £5.00 each.

Item 213 Magslip with gearing. Weight 8½kg. £2.00.

Item 214 Power unit, 24V D.C. input, 50V 40mA and 400 to 500V at 5mA A.C. output. Weight 4kg. 50p.

Item 215 Wattmeter 0-150W, 15V, 10A maximum, A.C./D.C., £2.00.

Item 216 Addo electric adding machines, £.s.d. type 10E, 6 figures in addition to 's' and 'd' which could be blanked off. 3 off. £2.00 each.

Item 217 Addo electric adding machine, £.s.d. type 47E, £2.00.

Item 218 Griffin earth inductor, G. and G.,L88-600. £3.00.

Item 219 Philip Harris demonstration transformer, P.7002.£3.00.

Item 220 Griffin Microid trolley, L22-600/005, £1.50.

Item 221 Wall mounted fly wheel, similar to Philip Harris, P10174. £2.00.

Item 222 Wall mounted wheel and axle (Compound), similar to Philip Harris P10166. £2.00.

Item 223 Fluid pressure apparatus, similar to Philip Harris, P10254. £1.00.

Item 224 Screw jack, G. and G., L22-420, £2.00.

Item 225 G. and G. Bar breaking apparatus, L41-150. 3 off. 50p.

Item 226 Adjustable resistances, Philip Harris, P7536-8. 1 off each. 25p.

Item 227 Griffin and Tatlock, Vernier microscope, £2.00.

Item 228 W. and J. George, Cathetometer (Vernier telescope), £2.00.

Item 229 Galvanometer lamp and scale on stand. 2 off. £1.00 each.

Item 230 Wheatstone bridges. 5 off 25p each.
Potentiometers, 10m, 8m, 4m, 1 off each. 25p each.

Item 231 Demonstration optical disc, G. and G. with lenses, diameter 60cm. Weight 7½kg. £3.00.

Item 232 Theodolite, student's model. £2.00.

Item 233 Electric bells, 3in diameter bell, 2.5V D.C. 5 off 25p.
6in diameter bell, 20-24V D.C. 6 off. 50p.
6in diameter bell, 10-12V D.C. 6 off. 50p.
Telephone base, bell unit, 20-24V A.C. 18 off. 35p.

Item 234 Mains power units for contamination meters No. 1. 50p.

Item 235 G.P.O. Hand generators, 90V A.C. 50p.

Item 236 G.P.O. type, Desk telephones with dial and exchange base. 2 off. £1.50. Without dial and base. 5 off. 50p.

Item 237 Twin fluorescent light unit, 110V 12W, 10in long, easily converted to 240V. 25 off. 75p each.

Item 238 Bunsen crucible furnace. 75p.

Item 239 Alloy bossheads for Kemiframe, Allen screws. 100 off. 5p each.

Item 240 Pulleys with bench clamp. 30 off. 10p each.

Item 241 Baty micro dial gauges, 0.001in. 2 off. £1.00.

Item 242 Airmec 702, audio oscillator 30Hz-30kHz. Weight 17kg. £5.00.

Item 243 A.C. Valve voltmeter, Cathode follower input. Ranges 0-1mV, 10mV, 100mV, 1V, 10V, 100V at 1-100kHz. Weight 17mg. £1.00.

Item 244 Cossor W4999 R.F. Oscillator. Weight 14kg. £1.00.

Item 245 Cinema screens, various sizes. £2.00 each.

Item 246 Wall mounting worm and wheel drive, fitted with pulleys to show mechanical advantage. Weight 24kg. £3.00.

Item 247 Wattmeter, 0-250W, 250V, 1A maximum A.C./D.C. £1.00.

Item 248 Circular motion apparatus for mounting on a rotating table. Allows accurate measurement of centripetal force at various speeds. £1.00.

Item 249 Moment of forces wheels. Similar to G. and G. L21-415, but wheels only. 2 off. 25p each.

Item 250 Weights, Imperial, iron, square shape with lifting rings, 0.1lb - 5lb. 2p each.

Item 251 Sets of Imperial brass weights with hangers. Total weight of set equals 1lb. 12 off. 10p each.

Item 252 Metric weights, iron, round, slotted, 0.5-5kg. 5p per kg.

Item 253 Weight hangers, Imperial. 6 off. 5p each.

Item 254 Photometer, Lumner Broden. 25p.

Item 255 Griffin electrical vibrator, L88-790. 50p.

Item 256 Ball ended magnets, 40cm. Set of 4. 25p.

Item 257 Griffin conductivity apparatus, Edser, L44-300. 10p.

Item 258 Engler viscometer, clockwork drive. No instructions on operation. Weight 25kg. 50p.

Item 259 Pensky Martin flash point tester. Similar to G. and G. S67-350 with spirit burner. £2.00.

Item 260 Clements and Desormes apparatus. Griffin and Tatlock. Weight 13.5kg. £1.00.

Item 261 Latent heat apparatus. Similar to Berthelot's apparatus, G. and G. L43-340. 50p.

Item 262 Linear expansion apparatus. Philip Harris P8112. £1.00.

Item 263 Circular motion turn table. Fitted with demonstration governor. Floor standing, 25kg. £2.00.

Item 264 Callander "J" apparatus. £1.00.

Item 265 Griffin hysteresis magnetometer, coil missing. 25p.

Item 266 Bernoulli effect apparatus, large demonstration model with 7 manometer tubes and scale. £2.00.

Item 267 Hookes Law apparatus, wall mounting, weight 19kg. £2.00.

Item 268 Foot bellows. 50p.

Item 269 Drive shaft testing assembly, complete with 1/8 H.P. 240V A.C. variable speed motor. Dimensions 60 x 6 x 20in, weight 36kg. £5.00.

Item 270 Hollow glass prisms. 2 off. 50p each.

Item 271 Griffin and George microprojector kit, heavy cast iron base. 2 projection lenses included. Fittings in this item can be used with the following item. £4.00.

Item 272 Griffin and George optics kit which is quite comprehensive. £4.00. Items 271 and 272 were listed in the Griffin and George catalogue preceding the present issue.

Item 273 Griffin Optical bench, model A, L53-130. Incomplete. 50p.

Item 274 Displacement vessels. G. and G. L26-150. 5p.

Item 275 Griffin universal mechanics set, L19-320, comprising 5 feet, 4 quick lock clamps and ten rods of various lengths. £1.00.

Item 276 Cossor T.V. alignment and pattern generator, type 1320. Weight 6kg. £1.00.

Item 277 Kemiframe rods. Various lengths. 5p each.

Item 278 B.S.R. audio oscillator, type L.O.50, 20Hz-16kHz, 0-20V Sine wave output, weight 15kg. 2 off. £5.00.

Item 279 Type 62H receivers 100-150MHz, by E.K.Cole Ltd., weight 21kg. 2 off. £5.00 and £300.

Item 280 Pye universal shunt, 10kΩ total resistance. 25p.

Item 281 Mullard GM4140/1 C-R bridge. 1Ω-1mΩ 100pF-1μF. "Magic Eye" null indicator. 1 off. 50p.

Item 282 Mullard GM4260/1, 50Hz and 1000Hz source, 2V output. Weight 2kg. 50p.

Item 283 Miscellaneous meters, 50μA to 5A F.S.D. Mostly L.H. zero, some special scales. 18 meters in all. 25p - £1.50 depending on type.

Item 284 Laboratory standard meters. 50mV 15cm mirror scale. ½% calibration accuracy. Weston type 45. Scaled 0-200, 0-100, 0-1000, weight 5kg. 4 off. £2.00 each.

Item 285 Thermocouple indicators 0-1200°C, for use with Ni-NiCr, 48.5mV, weight 2½kg, and 0-1400°C, Gallenkamp, type 6450Y, weight 3½kg. £2.00 each.

Item 286 Lenses and mirrors, various focal lengths. 5p each.

Item 287 B28 type receivers, weight 40kg. £6.00.

Item 288 Bimetal strips, different types, approx. 12cm long. 2½p each.

Item 289 Pye timer stopclock, clockwork, broken glass. 50p.

S.S.S.E.R.C., 103 Broughton Street, Edinburgh, EH1 3RZ.
Tel. 031-556 2184

Amal Limited, Holdford Road, Witton, Birmingham, 6.

Bioserv Limited, 38-42 Station Road, Worthing, Sussex.

Chemical Society Publications Sales Office, Blackhorse Road,
Letchworth, Herts.

Flamefast Engineering Ltd., Pendlebury Industrial Estate,
Bridge Street, Swinton, Manchester, M27 1FJ.

Gerrard and Haig Ltd., Gerrard House, Worthing Road,
East Preston, Sussex.

Griffin and George Ltd., Braeview Place, Nerston, East Kilbride.

Macfarlane Robson Ltd., Burnfield Avenue, Thornliebank, Glasgow, S.3.

Pyser-Britex (Swift) Ltd., Roussel House, North End Road,
Wembley, Middlesex, HA9 ONR.

Vickers Instruments, Haxby Road, York.

SCOTTISH SCHOOLS SCIENCE EQUIPMENT RESEARCH CENTRE

AMENDMENTS TO THE BIOLOGY EQUIPMENT LIST

February 1972

Many of these amendments - particularly those concerning the more expensive items such as microscopes - are made as a result of more suitable equipment coming onto the market since the original list was compiled. This is likely to be a continuing phenomenon, and we would therefore suggest that we be contacted directly when such items are to be purchased, so that our up-to-date opinions may be obtained.

	Item		Comment	
4.	Mouse Cage		Delete Bowman cage. Add:	
	Bioserv		BE13.04	£1.55
5.	Aquarium		The plastic aquaria on the original list are liable to break. Stronger - but slightly larger - types are available from pet shops, under the trade names 'Hyware' or 'Petcraft', or from:	
	Gerrard		'Hyware' type	85p.
12.	Mammal Cage		Delete both types listed. Add:	
	North Kent Associated Crates		RB1	£4 40
			Type 4 (stainless steel top)	£4 00
			The Associated Crates cage is also available with a transparent polycarbonate base, at £6.50.	
17.	Mammal Trap		A simple 'see-saw' version will be published in a future Bulletin.	
21.	Stackable Trays		Add:	
	Kabi	61 x 46 x 29cm	HX883	£3.00
			Not so rigid as the type specified on the original list, but larger and, particularly, deeper. See Bulletin 50 for use as a Xenopus water bath.	
52.	Specimen Tubes		Plastic types are cheaper alternatives.	
	Luckhams	72 x 17mm	PT/1772	per 500 £3 50
	Bioserv	72 x 17mm	BE35.04	per 100 0 90
55.	Light Meter		The Griffin Environmental Comparator is specifically designed for ecological field work	
	Griffin		S51-712 (Comparator)	£17 50
	Griffin		S51-716 (Handle)	£5 50
	Griffin		S51-718/070 (Lab. light probe)	£3 20
	Griffin	or	S51-718/074 (Field light probe)	£7 20
			Thermistor probes and a colorimeter attachment	

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	Griffin	or	S51-718/074 (Field light probe)	£7 20
			Thermistor probes and a colorimeter attachment are also available for the Comparator	
71.	Microscopes		('O' Grade) Delete both. Add:	
	Parisian Opera		Model 'C'	£19 20
	Reynolds and Branson		Meopta AZ-2	£21 60
			Duty remission may be obtainable on the Parisian Opera model with form DFA-3 from the Dept. of Trade and Industry. The Meopta is more suitable for lower school work, e.g. Integrated Science First Cycle. The Parisian Opera is suitable for all pupil work to 'O' grade.	

72. Microscopes ('H' Grade) Delete both. Add:

Gallenkamp	Olympus HSC	ML-075	£50 50
Griffin	Advanced	S58-680	£49 90

Duty remission may be obtainable on the Olympus model. A phase version of the Olympus, to the specifications given in Bulletin 46, is available at £76.00 including import duty. The bright field version is also available with a non-retractable 40x objective, at £47.50. Phase is not available for the Griffin model.

73. Stereo Microscopes Delete both. Add:

Prior	10x; 20x	Stereomaster	£56 50
Reynolds and Branson	10x; 20x	Grey 5/40	£73 45

Duty remission should be obtainable on the Grey 5/40. This model includes variable position, high intensity illumination; protected, swing-change objectives; and a working base. The Prior has overhead illumination, but its head can be moved through a greater angle than the Grey. The latter is more suitable for 'H' grade and Sixth Year Studies work.

79. Slide Boxes Replaced by

Slide Cabinet

Gerrard	2100 slides	NL124	£15 00
Griffin	1350 slides	S61-650/010	£13 05

86. Razor Blade Holder The 'Harris' holder is too small

88. Transparencies A complete list of slides and transparencies is in Bulletin 52.

Total cost about £80.00

107. Gas Burettes Delete.

113. Gas Microanalysis Tubes See Bulletin 50 for a simpler technique and a 'home-made' version.

118. Potometers Easily made. Details will be in a future Bulletin.

136. Butchart Balance Replace by:

Top Pan Balance (D)

S.S.I.C.	200g x 10mg	Sartorius 1106	£148.00
Griffin	400g x 10mg	S13-182 (Griffin-Torbal)	£145.00

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The 10mg sensitivity is essential. The limited capacity of these balances is compensated for by item 137. Alternatively, a combination of balances such as the Sartorius 1106 and 1104 (1000g x 100mg) may be shared between Biology, Chemistry and Physics.

152. Mousetail Measuring Box. Delete.

159. Visking Tubing Delete Griffin reference. Add:

Griffin	S75-395/010	£2.25

160. Respirometer — See Bulletin 48 for a 'home-made' design.

180. Eldon Cards. — Sera are a cheaper alternative.

Dutt	D240/K	1cm^3 of each	£1.25
Horwell	Anti-A	per 5cm^3	£1.60
Horwell	Anti-B	per 5cm^3	£1.60

187. Agaroids — No longer produced.

ADDITIONS TO BIOLOGY EQUIPMENT LIST

193. Scissors (P)

Gerrard	6in	AG1015	84p
Harris	15cm	B4762	90p

194. Forceps, pointed (P)

Gerrard	AG1115	45p
Harris	B4672	50p

195. Forceps, blunt (P)

Gerrard	AG1130	40p
Harris	B4674	50p

196. Scalpels (P)

Gerrard	2in blade	AG1190	44p
Harris		B4702/17	38p

197. Scalpel Handles, Swann-Morton (P)

Bioserv	No. 3	BE21.17	20p
Bioserv	No. 4	BE21.17	20p
G.B.I.	No. 3	33D	25p
G.B.I.	No. 4	36D	25p

198. Scalpel Blades, Swann-Morton (P)

Bioserv	No. 11	BE21.13	per pack of 6 12p
Bioserv	No. 23	BE21.13	per pack of 6 12p
G.B.I.	No.10A	35D	per pack of 6 15p
G.B.I.	No. 24	37D	per pack of 6 15p

199. Seekers (P) Wooden handle

Bioserv	BE21.12	4p
G.B.I.	68D	3p

200. Mounted Needles (P) Wooden handle

Dutt	D240/K		1cm^3 of each	£1.25
Horwell	Anti-A		per 5cm^3	£1.60
Horwell	Anti-B		per 5cm^3	£1.60

187. Agaroids — No longer produced.

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G.B.I.	No. 24	37D	per pack of 6	15p

199. Seekers (P) Wooden handle

Bioserv	BE21.12	4p
G.B.I.	68D	3p

200. Mounted Needles (P) Wooden handle

Gerrard	AG1060	4p
Harris	B4730/05	5p

201. Solid Watch Glasses (P)

G.B.I.	40mm x 40mm	184M	15p
Harris	40mm x 40mm	B4624	20p

202. Camel Hair Brushes (P)

Bioserv	BE21.01	8p
G.B.I.	156M	3p

203. Razor Blades, one-sided (P)

Local chemist, or:

Bioserv	BE21.06	per 50	62½p.

204. Test Tubes (P) Borosilicate glass

Harris	'Monax' 125 x 19mm	C1798/20	per 10 55p.
Griffin	'Pyrex' 150 x 19mm	S38835/050	per 12 67½p.

205. Plastic Three-Way Taps (P)

Henleys	'Pharmaseal'	30p.

Used in several physiology items, e.g. see Bulletin 48.

206. Model Heart (D)

Griffin	S51-048	£21.50
Harris	B5237	£16.00

Essentially the same model, but the Griffin one shows more of the blood vessels.

ADDITIONAL ADDRESSES

Associated Crates Ltd., Coronation Street, Stockport, Cheshire.

Bioserv Ltd., 38-42 Station Road, Worthing, Sussex.

G.B.I. (Labs) Ltd., Heaton Street, Denton, Manchester.

Henley's Medical Supplies Ltd., Alexandra Works, Clarendon Road, Hornsey, London, N.8.

A.R.Horwell (Reagents) Ltd., 2 Grangeway, Kilburn High Road, London, N.W.6.

Kabi (Electrical and Plastics) Ltd., Cranbourne Road, Potters Bar, Herts.

Luckham Ltd., Labro Works, Victoria Gardens, Burgess Hill, Sussex.

Parisian Opera and Field Glass Co. Ltd., 24-25 Princes Street, Hanover Square, London W.1.

Harris	'Monax' 125 x 19mm	C1798/20	per 10	55p.
Griffin	'Pyrex' 150 x 19mm	S38835/050	per 12	67½p.

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Luckham Ltd., Labro Works, Victoria Gardens, Burgess Hill, Sussex.

Parisian Opera and Field Glass Co. Ltd., 24-25 Princes Street, Hanover Square, London W.1.

Reynolds and Branson Ltd., P.O. Box H.P.1., North West Road, Leeds, LS6 2UX.

Scottish Scientific Instrument Centre,(. .I.C.)
42 George Street, Edinburgh.

For Duty Remission:-

Department of Trade and Industry, Tariff Division, Duty Remission Branch, Sanctuary Buildings, 20 Great Smith Street, London, S.W.1.

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